

QUERY RESPONSE SYSTEM

TECHNICAL FIELD

This invention relates to systems used to retrieve information or data to answer a query or question of a user. Preferably, the present invention may be implemented
5 through software adapted to search for information relating to a query posed by a user, and may also preferably be adapted to enlist the assistance of a specialist service provider if the information retrieved is unlikely to be employed successfully by the user. However, those skilled in the art should appreciate that other applications are also envisioned for the present invention, and reference to the
10 above only throughout this specification should in no way be seen as limiting.

BACKGROUND ART

A large variety and range of sources of information are available to the general public. If a person has a query, question or problem, a search can be performed for information which can assist them in answering directly the query or question
15 involved. Reference books, magazines, newspapers, and internet web page publications may all be accessed by the general public to address any number of different queries or problems over a wide range of fields of interest. However, due to the scope of the information available to most users, there is the potential for a person to retrieve (and will need to consider) a large volume of highly specialised
20 information when searching for an answer to their query. For example, completing a basic internet search using keywords can produce hundreds of pages of results which an unqualified member of the public may need to review to answer their current query.

By completing such searching, the general member of the public may not
25 necessarily find all the information relevant to their query nor have the patience to

consider all the information found. Furthermore, in highly specialised or technical fields, it is possible for the average person to misinterpret information they have at hand to come at the wrong answer for the current query. In addition, such specialised and potentially detailed information may also be difficult for the average
5 user to follow and also understand.

Specialist service providers can advise members of the general public with respect to the more detailed or complicated queries a person may have. However, these advisors normally charge a fee for their assistance or advice, and as such some people prefer to attempt to address any simple or uncomplicated queries
10 themselves first through basic research. However, due to a lack of specific background in the area of research, it can be difficult for members of the general public to identify exactly how complex or involved their current query is and also whether they are likely to successfully resolve their query without the assistance of a specialist service provider.

15 It would be of an advantage to have an improved system, method or apparatus available which could address any or all of the above problems. Specifically, it would be an advantage to have a system, method or apparatus which could indicate the likelihood of a query being successfully resolved by a person searching for information to either (or both) the person searching and a specialised service
20 provider working in the field of interest.

All references, including any patents or patent applications cited in this specification are hereby incorporated by reference. No admission is made that any reference constitutes prior art. The discussion of the references states what their authors assert, and the applicants reserve the right to challenge the accuracy and
25 pertinency of the cited documents. It will be clearly understood that, although a number of prior art publications are referred to herein, this reference does not

constitute an admission that any of these documents form part of the common general knowledge in the art, in New Zealand or in any other country.

It is acknowledged that the term 'comprise' may, under varying jurisdictions, be attributed with either an exclusive or an inclusive meaning. For the purpose of this specification, and unless otherwise noted, the term 'comprise' shall have an inclusive meaning - i.e. that it will be taken to mean an inclusion of not only the listed components it directly references, but also other non-specified components or elements. This rationale will also be used when the term 'comprised' or 'comprising' is used in relation to one or more steps in a method or process.

10 It is an object of the present invention to address the foregoing problems or at least to provide the public with a useful choice.

Further aspects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.

DISCLOSURE OF INVENTION

15 According to one aspect of the present invention there is provided a method of information retrieval which is adapted to execute the steps of

- i) receiving requirements information and identity information from a user, and
- ii) searching for information identified by said requirements information and retrieving said information, and
- 20 iii) delivering the retrieved information to the user identified by the received identity information, and
- iv) determining whether the delivered information will meet the requirements set out in the requirements information, and

- v) contacting a specialist advisor if the information delivered is unlikely to meet the user's requirements.

According to a further aspect of the present invention there is provided a method of information retrieval substantially as described above wherein the specialist advisor
5 is supplied with the user's identity information and requirements information.

According to a further aspect of the present invention there is provided a method of providing a response to a query which is adapted to execute the steps of

- i) receiving query information and identity information from a user, and
- ii) searching for information identified by said query information and retrieving
10 said information, and
- iii) delivering the retrieved information to said user, and
- iv) determining whether the delivered information can be successfully employed by the user to answer their query, and
- v) contacting a specialist advisor if the user is unlikely to successfully employ
15 the information delivered to answer their query.

According to yet another aspect of the present invention there is provided a method of providing a response to a query substantially as described above wherein the specialist advisor is supplied with the user's identity information and query information.

20 According to a further aspect of the present invention there is provided query response software which is adapted to execute the steps of

- i) receiving query information and identity information from a user, and

- ii) searching for information identified by said query information and retrieving said information, and
- iii) delivering the retrieved information to said user, and
- iv) determining whether the delivered information can be successfully employed
5 by the user to answer their query, and
- v) contacting a specialist advisor if the user is unlikely to successfully employ the information delivered to answer their query.

According to a further aspect of the present invention there is provided query response software which is adapted to execute the steps of

- 10 (i) receiving query information and identity information from a user, and
- (ii) searching for information identified by said query information and retrieving said information, and
- (iii) delivering the retrieved information to said user, and
- (iv) determining a query complexity threshold for the query information received
15 and
- (v) determining a user complexity threshold for the identity information received, and
- (vi) determining whether the query complexity threshold exceeds the user complexity threshold, and
- 20 (vii) contacting a specialist advisor if the query complexity threshold exceeds the user complexity threshold.

According to yet another aspect of the present invention there is provided query

response software substantially as described above wherein the specialist advisor contacted is supplied with the user's identity information and query information.

According to yet another aspect of the present invention there is provided a query response system which includes at least one computer system programmed with
5 computer software adapted to execute a method of responding to a query substantially as described above.

The present invention may be adapted to provide an information retrieval facility, service or system, and in preferred embodiments may provide a query response service or system. In its most basic forms the present invention may assist in the
10 retrieval of information and in preferred embodiments may be employed to actively assess a particular query, question or problem of a user and assist in the retrieval of information to answer said query.

The present invention also encompasses a method of retrieving information and responding to queries in addition to a system or apparatus adapted to execute
15 such a method. Preferably the system or apparatus employed may use computer software programmed into a computer system which is adapted to execute the steps required to implement the present invention.

Preferably a computer system as used in conjunction with the present invention may be formed from any type of programmable logic device and can also
20 encompass networks of such devices if required. Furthermore, the computer system used can employ a client / server architecture to provide multi-user access to the distributed facilities or functions provided.

Reference throughout this specification will also be made to the present invention being implemented through software loaded into a computer system. However,
25 those skilled in the art should appreciate that other types of technology may also

be employed to implement the present invention and reference to the above only throughout the specification should in no way be seen as limiting.

In a preferred embodiment the present invention may be implemented through or use an internet or web based interface. In such instances, internet based
5 transmission protocols can be employed to allow the software provided to communicate with a user. The software employed may run on a central host server and be accessed through client applications run by users. Furthermore, in preferred embodiments, client applications may be provided through standard internet or web page browsers, thereby eliminating need for a user to install
10 customised or new software to employ the present invention. The use of current internet technology also allows existing telecommunications and information technology infrastructure to be employed to implement the present invention. Existing web server technology may also be used to run a central server or host computer which can interact with commands, requests or information sent by
15 users.

In a preferred embodiment, the software employed and the facilities it provides may only be accessible to registered users or subscribers. Registered users can provide specific information to the administrator or operator of the present invention regarding their interests, requirements, qualifications or experience where this
20 information can in turn be employed in the execution of the method or methods of the present invention. Furthermore, by restricting access to the present invention, the operator of same may ensure that they can correctly identify which persons or organisations are using the facilities provided, and can employ this information to track the activities and interests of the users involved. The tracking of activities
25 can be used to improve the accuracy and responses of the facility provided by for example, caching information retrieved for common queries locally on the computer system contacted by users. Furthermore, if a particular area of subject

matter is popular with a group of users the operator or administrator of the present invention may decide to store locally greater volumes or amounts of information particular to the subject area of interest.

In a preferred embodiment, the first step executed by the method of the present invention may be the receipt of requirements information or query information from
5 a user. If for example, the present invention is implemented as a simple information retrieval facility, requirements information received may consist of keywords, phrases or text constructions indicating the field area of interest of a user from which information is to be retrieved in relation to. However, preferably
10 the present invention may be adapted to receive query information which details a specific question, query or problem currently facing the user involved. Such query information subsequently be employed constructively by the present invention to retrieve information which can be used to solve or answer said query.

Those skilled in the art should appreciate that the form or format of requirements
15 information or query information to be received will vary depending on a particular application within which the present invention is to be used, in addition to the specific technical implementation employed to provide the present invention. For example, in some instance this type of information may simply consist of a series of keywords submitted by a user or alternatively, may incorporate a paragraph or
20 phrase in natural language detailing specific concerns, queries or problems.

In a preferred embodiment, the present invention may also be adapted to receive identify information from a user in the initial stages of the method or methods executed. Such identify information may be employed to identify or specify the particular user currently employing the invention. Such identify information may
25 consist of a user name and also preferably a password which can be employed to both authorise the user's access to the facilities provided, in addition to being used

to retrieve further, more detailed information specific to the particular user identified.

For example in one preferred embodiment the user name submitted may be used to retrieve an associated database record where the database record also includes
5 a password field. Such a database record may be used to provide further, more detailed information regarding the particular user including their fields of expertise, experience and qualifications and/or historical information detailing the user's previous uses of the facilities provided in accordance with the present invention. A comparison between the submitted password and the stored password will then
10 validate or refuse the user's access to facilities provided in conjunction with the present invention.

Reference throughout this specification will also be made to the present invention being used to implement a query response method through appropriate computer software and hardware. Through the reception of query information and also
15 associated identify information, the present invention may be employed to assist a user in the resolution of a particular query or queries. However, those skilled in the art should appreciate that the present invention in its more basic forms may simply be used as an information retrieval system as discussed above and reference to the resolution of queries throughout this specification should in no way be seen as
20 limiting.

Preferably, once the requirements or query information has been received from a user, the present invention may be employed to execute a search for information to be used to answer the user's query. Such a search may be completed in any number of ways depending on the particular implementation of the present
25 invention employed. However, in a preferred embodiment, an internet based web search may be completed in addition to a search of locally stored electronic

resources or information held in or in association with the computer software employed to implement the present invention.

In a preferred embodiment the present invention may be employed primarily to search through electronic format information or records in the form of database
5 records. Information in an electronic form may be easily catalogued, assessed and traversed using software. For example, in a preferred embodiment the host or provider of the present invention may make available a local cache of their own resources and documentation generated "in-house". Furthermore, existing in-house or alternatively third party local or remote databases may also be accessed
10 in conjunction with the present invention. Such databases may provide electronic stores of information such as for example press cuttings, journal articles, bibliographic references, president legal documents, case notes, practice notes, document templates, document archives or email archives available in electronic form. Such electronic format documents or information may readily be retrieved
15 and supplied to a user.

Those skilled in the art should appreciate that any number and range of different types of documents may be searched, traversed and retrieved in conjunction with the present invention and any number of private, third party, public or commercial electronic databases may also be employed in conjunction with the present
20 invention.

Preferably any information retrieved in relation to a user's query information may be delivered directly back to the user once available. Preferably the present invention may not necessarily filter, adjust or modify such information in preferred embodiments. However, in alternative embodiments the present invention may
25 also be employed to assess the relevance of any information found and subsequently filter or remove some of the information which is considered to not

directly relate or not directly relevant to the query proposed by a user. In such instances the information delivered to a user for review can be reduced to a manageable level.

- In a further preferred embodiment once the information found by such a search
- 5 has been retrieved, an assessment may be made with respect to whether such information likely to be successfully employed by the user involved to answer their query. Alternatively, in other embodiments where the present invention is used as information retrieval system, an investigation may be made as to whether information retrieved is likely to meet the requirements of the user, as specified by
- 10 the requirements information submitted by the user. In all instances, an assessment can be made with respect to whether the quality, scope or complexity of the information retrieved or alternatively the scope, extent or complexity of the query posed by the user. This assessment can be executed to determine whether the information delivered will actually be of use to the user.
- 15 In a further preferred embodiment, such an assessment may be completed through calculating or determining a complexity threshold for a user, herein defined as a user complexity threshold. Preferably this threshold may be composed of or formed from a numeric value or other type of quantitative information which can be ranked or prioritised. The user complexity threshold calculated need not
- 20 necessarily scale or relate to any real quantity but may just be used to indicate the user's threshold for successfully assessing or using the information retrieved to solve a specific query or to meet the requirements specified.

In addition, a complexity threshold for the query specified by a user may also be determined or calculated, herein defined as a query complexity threshold. The

25 query complexity threshold can give an indication as to the degree of difficulty or complexity of the problem currently facing a user, and preferably may take the form

of a quantifiable value property (preferably a numeric reference) which can be ranked or prioritised.

In a preferred embodiment, the user complexity threshold may be compared with the query complexity threshold to determine whether a user is likely to successfully
5 employ the information retrieved and subsequently delivered to answer a query. Furthermore, in other alternative embodiments, a user complexity threshold may be compared with a requirements complexity threshold when the present invention is employed simply to retrieve the information meeting the user's requirements. These two threshold values may then be compared with respect to one another to
10 determine the user's likelihood of success employing in the information delivered.

The complexity thresholds discussed above may be calculated or determined using any number of different types of mechanisms, procedures or algorithms.

For example, in a preferred embodiment a user complexity threshold may be calculated employing a user modelling agent.

15 User modelling can be undertaken by applying one or more heuristics interpreted against a rule base. Relevant heuristics could be:

- Causality – why a user performs actions. The user intent ascription states that a user performs actions in response to environmental stimuli and to achieve some goal.
- 20 • Context – what is the current context. For certain types of interface agents – e.g. agents for information filtering and/or data mining – the current context is important. For example, if a user is referring to a bank, it is useful to know whether he/she are referring to a financial institution or a river bank. The context of previous interactions may help disambiguate the current use of a
25 word.

- Frequency – how often a user performs an action. Some interface agents use a facing function so actions become less relevant as time progresses.
- Human-factors – who is the user. Knowing user information a priori can be useful for adapting the interface to the user's needs. Human-factors such as psychological factors (e.g. spatial ability, cognitive ability, temporal ability), as well as psychological factors (e.g. skill level, age) may be directly applicable to the user's needs.
- Modality – what modes a user prefers, or uses explicitly or implicitly. This heuristic captures a large portion of the meaningful characteristics in direct manipulation interfaces. For example, what skill level (expert, intermediate, novice) does the user prefer? What type of ways do they like to view their information (e.g. full page, page layout, outline)? What presentation methods such as textual, graphical, audible or natural language they prefer or not?
- Resource usage – what resources a user needs.

However, in an alternative embodiment different mechanisms may also be implied. For example, anyone of the following mechanisms may also be used if required.

Appropriateness Criteria Modelling Agent – cognitive agent architecture based on a series of user metrics including goals and beliefs, cognitive and spatial skills and preferences ranking which are assumed forming the basis of a model to which the user is compared via a series of questionnaires. With the help of a rule base each agent is capable of combining threshold values with preferences information received from the user. The further series of interview with quantify goals and validate the appropriateness of the model.

Procedural Reasoning Systems Agent – PRS architecture consist of (1) a database

containing current facts and beliefs, (2) a set of goals to be achieved, (3) a set of plans or procedures describing how certain sequences of conditional tests and actions may be performed to achieve certain goals or to react to certain situations, and (4) an interpreter that manipulates these components to select and execute
5 appropriate plans for achieving the system's goals. PRS agents provide a generic architecture for reasoning systems. They employ three main elements, being a database of current system beliefs, a library of plans, an intention graph consisting of the ordered set of plans. These components are manipulated by an interface routine which executes one step in the selected intention.

- 10 Domain-specific Syntactic and Semantic Content Consideration Agent – how a user with content or structure of documents determines cognitive ranking. Agent performs evaluative routine against assumed norms.

Wizard of Oz Agent – the user interacts with application while a human expert provides application assistance. The user is unaware the assistance is being
15 provided by human expert. The effect is a person "behind the curtain" able to rank the user's complexity threshold.

Those skilled in the art should also appreciate that similar mechanisms or systems may also be employed to calculate both user and query threshold in conjunction with the present invention.

- 20 In a preferred embodiment, if the comparison of complexity thresholds indicates the user is unlikely to succeed, a specialist advisor may be contacted, with the specific user information and query information supplied in turn being delivered to such a specialist advisor. This feature of the present invention may automatically alert the specialist advisor involved that the user employing the present invention
25 has a query that they may not necessarily be able to successfully resolve without help. Such a specialist advisor may employ the identity information delivered to in

turn contact the user directly to discuss their query or requirements.

In a further preferred embodiment, the user in question may also be alerted to the fact that the present invention has determined they are unlikely to successfully employ the information delivered to resolve their query or to successfully meet the requirements they have specified. In such instances the user may be advised that a specialist advisor has been contacted to assist them in correctly addressing their query or current requirements.

In a further preferred embodiment, the specialist advisor to be contacted may be directly involved with the administration, running or provision of the facilities provided in accordance with the present invention. This allows a specialist advisor in any number of different types of fields or areas of expertise to employ the present invention to answer the more basic or simple queries posed by clients or customers, using automated software, functions or facilities. The present invention may also provide a catch-all safety net facility which will bring a particular customer or client to the attention of the specialist advisor if they are identified as unlikely to be able to successfully use the information they are delivered.

The present invention may provide many potential advantages over existing systems for retrieving information or responding to queries.

A user may interact with the system provided to retrieve information pertaining to a particular query or to specify an area of interest with requirements information. Related information can then be delivered back to such a user without necessarily having to involve a specialised advisor to the information involved. Such a specialist advisor may also be contacted if it appears that the user is unlikely to successfully use any or all of the information delivered.

The present invention may assist in the answering of user queries while

safeguarding users from incorrectly assessing or analysing the information delivered to them. The present invention may test or assess the user's ability to employ such information and provide a warning or access to specialist advice if required.

5 **BRIEF DESCRIPTION OF DRAWINGS**

Further aspects of the present invention will become apparent from the following description which is given by way of example only and with reference to the accompanying drawings in which:

10 Figure 1 shows a flowchart of steps taken and tests made by software employed to implement the present invention in a preferred embodiment, and

Figure 2 illustrates the operation and interrelationship of specific software modules constructed to implement the software discussed with respect to figure 1, and

15 Table 1 provides further information regarding the modules or agents discussed with respect to figure 2.

Figure 3 shows a flowchart of steps taken and processes executed by software employed by the present invention in an alternative embodiment.

20 **BEST MODES FOR CARRYING OUT THE INVENTION**

Figure 1 shows a flowchart of steps taken and tests made by software employed to implement the present invention in a preferred embodiment. In the situation shown, the present invention is implemented through software which is provided or administered by a lawyer or a lawyer's office. Such software is used to assist the

lawyer's clients in researching and assessment relatively simple queries and also to alert the lawyer or lawyers involved when a client has a query which they are unlikely to be able to successfully resolve without assistance.

In the implementation discussed, a lawyer's client initially starts up their own remote computer system and uses an internet web browser to access the lawyer's server and computer system. Through xml/html page rendering, the lawyer's web server sends a series of web pages and some web based forms to be filled in by the client using their own web browser client and computer system. Once completed, these forms are then sent back to the lawyer's web server for subsequent analysis and assessment by processing components of the software employed to implement the present invention.

At this stage, the web server's interface agent (IA) systems determines whether the forms rendered for the client were successfully filled out and all of the information required by the software involved has been provided by the client. If any of the fields in the forms presented are missing, the client is required to resubmit these forms to provide all the information required.

As part of the information requested and transmitted through web page forms, a client submits identify information and query information. Identify information consists of the user name and password which allows the system employed to both positively identify the user and also validate their access rights to the facilities provided. The query information submitted by a user identifies in plain language a particular problem faced by the user or alternatively, in some instances, consists of requirements information which simply set out keywords relating to a field or area of interest to the client.

Once both the identity information and query information has been received by the software employed, a search is completed to retrieve any or all information

resources to be used in answering the client's query.

When information found by this search has been retrieved, the software employed calculates both a user complexity threshold and a query complexity threshold. These threshold parameters or values indicate a user's ability to assess
5 information retrieved in addition to the complexity of the information retrieved. Once these two thresholds have been calculated or determined, the software provided then tests whether the client has the ability to successfully assess the information retrieved.

If the client is unlikely to succeed, a system notification component generates an
10 email or phone message or application alert message or all of the fore-mentioned notifications, that is then employed to contact the lawyers involved and prompt them to contact the client and render assistance in relation to the client's query.

If the software provided indicates that the client is likely to successfully employ the information retrieved, this information is sent directly to the client with a prompt for
15 the client to confirm that the information delivered is appropriate. If the client is not satisfied with the quantity or quality of the information delivered, the above steps may be repeated to trigger the searching and retrieval of further information in relation to the client's query. If the client is satisfied, they may then be disconnected from the web server and software provided.

20 Figure 2 illustrates the operation and interrelationship of specific software modules constructed to implement the software discussed with respect to figure 1.

Table 1 provides further information regarding the modules or agents discussed with respect to figure 2.

The software employed in conjunction with the present invention uses a series of
25 modules or specific agents to provide the functions or facilities required by the

present invention.

User interface agents are written to handle the interaction with the clients' web browser including the requests for and receipt of user identity information and query information from the lawyers' client.

- 5 The analysis agent is employed to assess the complexity of a user's query and also the complexity of information retrieved to be used to answer a user's query. Furthermore, the analysis agent calculates both a user complexity threshold, and a query complexity threshold in turn uses these complexity thresholds to determine whether the user is likely to successfully answer their own query with the
- 10 information retrieved and delivered.

Information searching agents also make up another separate module or agent employed with the software provided. These agents are written for specific information domains or areas of legal expertise, and are given the appropriate instructions or input parameters from the analysis agent to search for and

15 subsequently retrieve electronic information resources.

A management computer agent or module is employed to handle the execution and operation of each of the modules or agents discussed above. Such a management application interfaces with the operating system, virtual machine or execution environment employed on the computer system running such software to

20 control the execution of each module depending on the flow of control processes to be completed, as discussed with respect to figure 1.

Figure 3 shows a flowchart of steps taken and processes executed by software employed by the present invention in an alternative embodiment.

In the embodiment shown and illustrated with respect to figure 3, a similar

25 mechanism or procedures are employed with respect to that discussed in relation

to figure 1. Figure 3 illustrates a more explicit alternative application of the present invention where a user is requesting financial based information in relation to structures to be employed in conjunction with the business. The software provided through the agents discussed process the user's queries and retrieve relevant
5 information and/or contact a specialist professional advisor for the user depending on the outcomes of the assessments made.

It should be noted that documents need not be contained to one specific knowledge domain, as all documents are subjected to preclassification algorithms (including metadata extraction, automatic keyphrase extraction, domain relevancy,
10 domain complexity, word frequency analysis, corpus complexity) prior to indexing and storage. These algorithms may classify a document as relevant to multiple domains including differing levels of complexity for each domain.

Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto
15 without departing from the scope thereof as defined in the appended claims.